

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Withdrawn) An injection-molding method for covering a plate-shaped member having a through hole extending from a front face to a rear face with a molded layer by injection-molding, the injection-molding method comprising the steps of:

preparing a first die having a gate that will face the through hole and a front side cavity face that will face the front face of the plate-shaped member, a second die having a receiving face for receiving the rear face of the plate-shaped member and a pin for blocking the through hole, and a third die having a rear side cavity face that will face the rear face of the plate-shaped member;

sandwiching the plate-shaped member with the first die and the second die and forming a front side cavity with the front side cavity face of the first die and the front face of the plate-shaped member;

molding a front side molded layer to the front face of the plate-shaped member by injecting a molding material such as resin through the gate into the front side cavity;

opening the through hole and forming a front side cavity with the rear side cavity face of the third die and the rear face of the plate-shaped member by

replacing the second die with the third die; and

molding a rear side molded layer to the rear face of the plate-shaped member by piercing the front side molded layer with an injection pressure injecting molding material through the gate and filling the rear side cavity with molding material by way of the through hole.

2. (Withdrawn) An injection-molding apparatus including a first die, a second die, a third die, and means for moving the second and third dies, said apparatus being constructed to mold a front side molded layer to a front face of a plate-shaped member by sandwiching the plate-shaped member with the first die and the second die being closed and thereby forming a front side cavity with the front face of the plate-shaped member and the first die and filling the front side cavity with a molding material such as resin and to mold a rear side molded layer to the rear face of the plate-shaped member by replacing the second die with a third die and sandwiching the plate-shaped member with the third die and the first die and thereby forming a rear side cavity with the rear face of the plate-shaped member and the third die and filling the rear side cavity with a molding material such as resin, wherein:

the first die includes a gate for injecting molding material into the front side cavity and the rear side cavity, said gate being adapted to face a through hole formed in the plate-shaped member;

the second die includes a receiving face for making contact with the rear face of the plate-shaped member, and wherein the receiving face includes a pin adapted to fit in the through hole; and

to replace the second die with the third die, the moving means is adapted to

move the second and third dies between a facing position facing the first die and a withdrawn position away from the first die.

3. (Withdrawn) The injection-molding apparatus according to claim 2, wherein the third die includes a support projection for supporting the plate-shaped member by abutting with the plate-shaped member near the through hole.

4. (Withdrawn) An injection-molding method for covering a front face and a rear face of a plate-shaped member with a molded layer by injection-molding, the injection-molding method comprising the steps of:

preparing a first die having a front side cavity face that will face the front face of the plate-shaped member and a first gate opening at the front side cavity face and a first pressure sensor communicating with the front side cavity face and preparing a second die having a rear side cavity face that will face the rear face of the plate-shaped member and a second gate opening at the rear side cavity face and a second pressure sensor communicating with the rear side cavity face;

sandwiching the plate-shaped member with the first die and the second die and thereby forming a front side cavity with the front side cavity face of the first die and the front face of the plate-shaped member and forming rear side cavity with the rear side cavity face of the second die and the rear face of the plate-shaped member;

injecting a molding material such as resin through the first gate into the front side cavity and injecting a molding material through the second gate into the rear side cavity; and

stopping the injection of molding material into the front side cavity when a measured value of the first pressure sensor reaches a prescribed value and stopping the injection of molding material into the rear side cavity when a measured value of the second pressure sensor reaches a prescribed value, to mold front and rear side molded layers respectively in the front and rear side cavities.

5. (Withdrawn) An injection-molding apparatus comprising a first die, a second die, a third die, and control means, said apparatus being constructed to sandwich a plate-shaped member with first and second dies and thereby form a front side cavity with a front face of the plate-shaped member and the first die and form a rear face cavity with a rear face of the plate-shaped member and the second die and fill the front and rear side cavities with a molding material such as resin to mold a front side molded layer to the front face of the plate-shaped member and mold a rear face molded layer to the rear face of the plate-shaped member, wherein:
 - the first die has a first gate communicating with the front side cavity and a first pressure sensor for measuring an internal pressure of the front side cavity;
 - the second die has a second gate communicating with the rear side cavity and a second pressure sensor for measuring an internal pressure of the rear side cavity; and
 - the control means is adapted to stop injection of molding material into the front side cavity based upon a signal from the first pressure sensor when the internal pressure of the front side cavity has reached a prescribed value and to stop injection of molding material into the rear side cavity based upon a signal from the second pressure sensor when the internal pressure of the rear side cavity has reached a

prescribed value.

6. (Currently Amended) An injection-molding method for covering a front face ~~and a rear face of a plate-shaped member with a front side molded layer by injection-molding using a first die and a second die and a rear face of the plate-shaped member with a rear side molded layer by injection-molding using the first die and a third die,~~ the injection-molding method comprising the steps of:

~~preparing a first the first die having a front side cavity face provided in opposed relation to a mating face of the second die that will cover for covering the front face of the plate-shaped member, a first gate opening at the front side cavity face and extending substantially perpendicularly to the mating face of the second die, a second gate avoiding provided in such a manner as to bypass the front side cavity face and to open at a face to be mated with the second die and having a portion extending from an opening at the face to be mated with the second die substantially perpendicularly to the face to be mated with the second die, and switching means for guiding molding material to either one of the first and second gates;~~

~~preparing a second the second die having a receiving face for receiving the rear face of the plate-shaped member;~~

~~preparing a third the third die having a rear side cavity face that will cover for covering the rear face of the plate-shaped member, and a substantially J-shaped connecting passage opening at the rear side cavity face and at a face to be mated with the first die that so as to fluidly connects connect the second gate to the rear side cavity face and having a portion extending from an opening at the face to be~~

mated with the first die substantially perpendicularly to the face to be mated with the first die;

sandwiching the plate-shaped member with the first die and the second die and forming a front side cavity with the front side cavity face of the first die and the front face of the plate-shaped member;

injecting a molding material through the first gate into the front side cavity to mold ~~a front~~ the front side molded layer;

replacing the second die with the third die and thereby forming a rear side cavity with the rear side cavity face of the third die and the rear face of the plate-shaped member; and

injecting a molding material from the second gate through the connecting passage into the rear side cavity to mold ~~a rear~~ the rear side molded layer.

7. (Withdrawn) An injection-molding apparatus comprising a first die, a second die, a third die, and means for moving the second and third dies, said apparatus being constructed to mold a front side molded layer to a front face of a plate-shaped member by closing the first and second dies and sandwiching the plate-shaped member and the first die and filling the front side cavity with a molding material such as resin and to mold a rear side molded layer to a rear face of the plate-shaped member by replacing the second die with a third die and sandwiching the plate-shaped member with the third die and the first die and thereby forming a rear face cavity with the rear face of the plate-shaped member and the third die and filling the rear face cavity with molding material, wherein:

the first die includes a first gate facing the front side cavity, a second gate avoiding the rear side cavity, and switching means for guiding molding material to either one of the first and second gates;

the second die includes a receiving face for making contact with the rear face of the plate-shaped member;

the third die includes a connecting passage for connecting the second gate to the rear side cavity; and

the moving means are adapted to move the second and third dies between a facing position facing the first die and a withdrawn position away from the first die so as to permit the second die to be replaced with the third die.

8. (Withdrawn) The injection-molding apparatus according to claim 2, wherein the front side cavity and the rear side cavity are formed so that the front side molded layer and the rear side molded layer are made to extend as far as an outer edge of the plate-shaped member and such that the molded layers contact one another.

9. (Withdrawn) The injection-molding apparatus according to claim 3, wherein the front side cavity and the rear side cavity are formed so that the front side molded layer and the rear side molded layer are made to extend as far as an outer edge of the plate-shaped member and such that the molded layers contact one another.

10. (Withdrawn) The injection-molding apparatus according to claim 7,

wherein the front side cavity and the rear side cavity are formed so that the front side molded layer and the rear side molded layer are made to extend as far as an outer edge of the plate-shaped member and such that the molded layers contact one another.